REMARKS

In response to the Final Office Action mailed March 15, 2005, Applicant respectfully requests reconsideration.

Claims 1-19 were previously examined and are pending in this application, of which claims 1, 7 and 12 are independent. No claim amendments are included herein, and no new matter has been added.

1. Illustrative Examples

For illustrative purposes only, Applicant provides the following example of one aspect of Applicant's invention, and does not intend to limit the scope of the claims. The Examiner is respectfully requested to give careful consideration to the language of each of the independent claims and to address each on its own merits, without relying on the specific example. In this respect, Applicant does not rely on this example to distinguish any of the independent claims of the present invention over the asserted references, but rather, rely upon the arguments presented below.

Table 1 below shows illustrative examples of traces of internal signals of a hardware design. Support for Table 1 can be found through the specification, for example, from page 3, line 20 to page 4, line 31. The first column identifies a signal, and the following columns illustrate the value of the signal at a particular time. For example, the first row is for signal S_1. S_1 has values of: S_{11} at time t_1; S_{12} at time t_2; and S_{1n} at time t_n. Each row of the table may be considered a trace of the signal identified in the first column. Thus, each trace may include signal data (e.g., S_1), time data (e.g., t_1, t_2 . . . t_n) and internal signal values (e.g., S_{11}, S_{12} . . . S_{1n}).

	Time			
Signal	**t_1**	**t_2**	**. . .**	**t_n**
S_1	S_{11}	S_{12}		S_{1n}
S_2	S_{21}	S_{22}		S_{2n}
.				
.				
.				
S_n	S_{n1}	S_{n2}		S_{nn}

Table 1: Illustrative Example of Traces

A state may include a set of signal values that each correspond to a respective one of a plurality of components within a hardware design. Thus, a state, State A, may be defined as follows: State A = {S_1= "X", S_2= "Y", . . ., S_n= "Z"}. That is, State A is a state in which signal S_1 has a value "X", the state S_2 has a value "Y" and the state S_n has a value "Z".

In some embodiments of the invention, the traces are processed to ascertain whether the plurality of components simultaneously have the signal values defined for at least one state. For example, it may be determined whether at any of the times t_1-t_n, the signals S_1-S_n have the values defined for State A. For example, it may be determined whether S_{11}, S_{21}, . . ., S_{n1} have values "X", "Y", . . ., "Z", respectively, at any given time.

2. Claims 1-6 Patentably Distinguish Over Hollander

Claim 1 stands rejected under 35 U.S.C. § 102(e) as purportedly being anticipated by U.S. Patent No. 6,675,138 (Hollander). Applicant respectfully disagrees.

As noted in Applicant's previous response, Hollander does not teach or suggest the step of "processing the traces to ascertain whether the plurality of components simultaneously have the signal values defined for the at least one state, thereby to ascertain whether the at least one state was achieved," as required by claim 1. Applicant further explained that Hollander does not teach the term "state" as this term is used in claim one.

The Final Office Action essentially reiterates the rejection of claim 1 with respect to Hollander, only adding on page 5, Section 7: "Applicants point to a few selected portions of Hollander and conclude that Hollander discloses single-variable states. This is not correct. In response to Applicant's argument, please see, for example, the abstract, col. 3, lines 5-20; col. 4, lines 55-63; col. 6, lines 62-66. The sections clearly recited multi-variant states."

Firstly, in the previous response, Applicant was attempting to make clear that the term "state" as applied in Hollander is different than that use of this term in claim 1. Applicant now takes this opportunity to eliminate any ambiguity in this regard. Claim 1 explicitly recites "defining at least one state to be verified, the at least on state including a set of signal values, each signal value corresponding to a respective one of a plurality of components within the hardware design." Hollander does not disclose or suggest defining a state in this manner. Even though Hollander discloses the use of multiple variables, Hollander does not teach or suggest

defining a state including a set of values for these variables, much less defining at least one state in the manner required by claim 1.

Consequently, because Hollander does not disclose defining a state in the manner recited in claim 1, it could not possibly disclose "processing the traces to ascertain whether the plurality of components simultaneously had the values defined for the at least one **state**" [emphasis added]. Rather, as set forth in Applicants previous response, Hollander describes determining the state of *individual variables* when ascertaining each variable's presence or absence. That is, Hollander is specifically looking for a "coverage hole" indicated by the absence of a particular value from a family of values.

Thus, Hollander does not teach these steps of "defining" and "processing" recited in claim 1.

So that there is no doubt about the deficiency of Hollander in teaching these limitations of claim 1, Applicant provides the following analysis of each of the portions of Hollander cited in the final Office Action with respect to each of these limitations. A bullet point precedes each portion of Hollander cited in the Final Office Action, followed by Applicant's analysis.

First, with respect to the step of "defining at least one state to be verified . . . ":

- Figure 1, column 3:

Figure 1 says nothing about states or signal values at all. Column 3 uses the word "state" to refer to the states of "coverage items" which are "variables" (column 4, line 43). Each variable has a value (column 4, line 61) which can be in a particular state. A state is not "a set of signal values", but refers to the value for one variable only.

- Column 4, line 39 to column 5, line 4:

There is no disclosure here of the state including a set of signal values. A state refers to a particular variable (column 5, line 10). There is reference to a set of values (column 5, line 16) which refers to the case where a number of values are taken at different points in time for the *same* variable. There is no disclosure of a state including "a set of signal values".

- Column 5, line 63 to column 6, line 22:

There is no disclosure here of a state including a set of signal values. There are values for each variable (column 5, line 64). Each variable can have a state, but a state is not a set of signal values.

With respect to the step of "processing the traces . . . ":

- Figure 1:

There is no disclosure in Figure 1 of "processing traces". There is a data analyzer 26 which analyses data as described at column 6, line 10, looking for "coverage holes". A coverage hole is indicated by the absence of a particular value from a family of values (column 3, line 20). For example, referring to Table 1 above, this would be like looking for a missing value for S_1 in one of the columns for t_1-t_n (e.g., sampling the data and then noting a missing value at that point). Hollander does not teach in Figure 1 collecting values for different components across different traces to compare them and ascertain whether a plurality of components simultaneously have signal values defined for a particular state.

- Column 4, line 39 to column 5, line 4:

This passage does not discuss processing traces. It discusses analyzing data to search for a coverage hole, indicated by the absence of a particular value from a family of values (column 4, lines 53-54).

- Column 5, line 63 to column 6, line 22::

This passage does not disclose "processing the traces". In fact, this passage discloses nothing of relevance to how the data is analyzed.

In view of the foregoing, Applicant respectfully submits that claim 1 patentably distinguishes over Hollander. Accordingly, Applicant respectfully requests that the rejection of claim 1 under §102(e) as being anticipated by Hollander be withdrawn. Claims 2-6 each depend from claim 1 and are patentable for at least the same reasons. Accordingly, Applicant respectfully requests that the rejections of these claims be withdrawn.

It is noted that Applicant has taken great care to discuss each relevant passage of Hollander cited in the Office Action with respect to the limitations of claim 1 discussed above. Accordingly, Applicants respectfully request that, if the Examiner still believes that claim 1 is not patentable over Hollander, the Examiner respond to Applicant's arguments with similar specificity.

3. Claims 1-6 Patentably Distinguish Over Baumgartner

Claim 1 stands rejected under §102(e) as purportedly being anticipated by U.S. Patent No. 6,074,426 (Baumgartner). Applicant respectfully traverses this rejections.

Baumgartner is directed to the automatic formal verification of logic systems (Col. 1, lines 7-9). Baumgartner discloses using model checking on state transitions captured during simulation testing of the design. The methodology consists of utilizing the state transitions and

the inputs causing those state transitions (as observed during simulation) to define legitimate input values that can be applied, non-deterministically and exhaustively by a model checker to the design under test. (Col. 2, lines 19-26).

Baumgartner does not teach or suggest the method recited in claim 1, in particular, the step of "processing the traces to ascertain whether the plurality of components simultaneously had the values defined for the at least one state, thereby to ascertain whether the at least one state was achieved." The Final Office Action contends that Baumgartner teaches this step 3 at various locations, each of which will not be addressed in turn.

- Column 1, line 51 to column 2, line 11:

This passage does not disclose processing traces at all, but merely references verification of state transitions.

- Column 5, lines 30-65:

There is no discussion in this passage of processing traces. Baumgartner describes processing trace information by exploring all possible "walks" comprising the transitions seen in simulation (col. 5, line 18 to 29). The model checker determines which input values can be applied at any given cycle by using the transitions in the traces. However, this is not "processing the traces *to ascertain whether the plurality of components simultaneously have signal values defined for the state*". Rather, Baumgartner is looking for *state transitions* and for the *set of inputs which cause those state transition*, not looking for a simultaneous set of signal values. For example, referring to Table 1 above, Baumgartner does not teach looking at each of columns for $t_1 - t_n$ for values "X", "Y" and "Z". Rather, Baumgartner looks at the transitions between the values in columns t_1, t_2 . . . and t_n and for the set of input signals that causes these transitions.

- Figure 2 (multivariate state):

This figure and its supporting disclosure simply do not discuss processing traces.

- Figure 4 to 7:

Figures 4 and 6 are discussed from col. 4, line 66 to col. 5, line 29. As discussed above, this passage does not teach the "processing" step of claim 1, but rather, describes how the model checker walks through state transitions to determine the causal inputs.

In view of the foregoing, Applicant respectfully submits that claim 1 patentably distinguishes over Baumgartner. Accordingly, Applicant respectfully requests that the rejection of claim 1 under §102(e) as being anticipate by Baumgartner be withdrawn. Claims 2-6 each

depend from claim 1 and are patentable for at least the same reasons. Accordingly, Applicant respectfully requests that the rejections of these claims be withdrawn.

It is noted that Applicant has taken great care to discuss each relevant passage of Baumgartner cited in the Office Action with respect to the limitations of claim 1 discussed above. Accordingly, Applicants respectfully request that, if the Examiner still believes that claim 1 is not patentable over Baumgartner, the Examiner respond to Applicant's arguments with similar specificity.

4. Claims 7-11 Patentably Distinguish Over Hollander

For reasons that should be clear from the discussion of Hollander set forth above, new claim 7 patentably distinguishes over Hollander at least because Hollander does not disclose or suggest the step of "processing the traces to ascertain whether the plurality of components simultaneously had the signal values defined for the at least one state, thereby to ascertain whether the at least one state was achieved," as recited in claim 7.

Further, Hollander does not disclose or suggest the step of "pre-processing the traces such that, for at least each of the components for which a signal value is defined within the at least one state, the trace associated with the component includes a signal value for each time for which the traces are to be processed," as recited in claim 7. There is absolutely no disclosure whatsoever in Hollander of ensuring that "a trace associated with a component includes a signal value for each time for which the traces are to be processed".

In view of the foregoing, claim 7 patentably distinguishes over Hollander. Accordingly, Applicant requests that the rejection of claim 7 under §102(e) as being anticipated by Hollander be withdrawn. Claims 8-11 each depend from claim 7 and are patentable for at least the same reasons. Accordingly, Applicant requests that the rejection of each of these claims be withdrawn.

5. Claims 7-11 Patentably Distinguish Over Baumgartner

For reasons that should be clear from the discussion of Baumgartner set forth above, new claim 7 patentably distinguishes over Baumgartner at least because Baumgartner does not disclose or suggest the step of "processing the traces to ascertain whether the plurality of components simultaneously had the signal values defined for the at least one state, thereby to ascertain whether the at least one state was achieved," as recited in claim 7.

Further, Baumgartner does not disclose or suggest the step of "pre-processing the traces such that, for at least each of the components for which a signal value is defined within the at least one state, the trace associated with the component includes a signal value for each time for which the traces are to be processed," as recited in claim 7. Rather, the traces in Baumgartner do not comprise a set of signal values for each component and, therefore, cannot be pre-processed as recited in claim 7.

In view of the foregoing, claim 7 patentably distinguishes over Baumgartner. Accordingly, Applicant requests that the rejection of claim 7 under §102(e) as being anticipated by Baumgartner be withdrawn. Claims 8-11 each depend from claim 7 and are patentable for at least the same reasons. Accordingly, Applicant requests that the rejection of each of these claims be withdrawn.

6. Claims 12-19 Patentably Distinguish Over Hollander

For reasons that should be clear from the discussion of Hollander set forth above, new claim 12 patentably distinguishes over Hollander because Hollander does not disclose or suggest the step of "determining whether the at least one state was achieved, including comparing signal values within the traces to the set of signal values defined for the at least one state."

Accordingly, Applicant requests that the rejection of claim 12 under §102(e) as being anticipated by Hollander be withdrawn. Claims 13-19 each depend from claim 7 and are patentable for at least the same reasons. Accordingly, Applicant requests that the rejection of each of these claims be withdrawn.

7. Claims 12-19 Patentably Distinguish Over Baumgartner

For reasons that should be clear from the discussion of Baumgartner set forth above, new claim 12 patentably distinguishes over Baumgartner because Baumgartner does not disclose or suggest the step of "determining whether the at least one state was achieved, including comparing signal values within the traces to the set of signal values defined for the at least one state."

Accordingly, Applicant requests that the rejection of claim 12 under §102(e) as being anticipated by Baumgartner be withdrawn. Claims 13-19 each depend from claim 7 and are patentable for at least the same reasons. Accordingly, Applicant requests that the rejection of each of these claims be withdrawn.

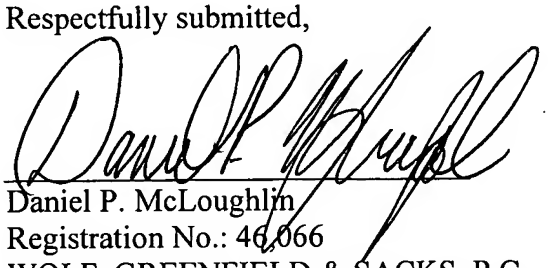
CONCLUSION

A Notice of Allowance is respectfully requested. The Examiner is requested to call the undersigned at the telephone number listed below if this communication does not place the case in condition for allowance.

If this response is not considered timely filed and if a request for an extension of time is otherwise absent, Applicant hereby requests any necessary extension of time. If there is a fee occasioned by this response, including an extension fee, that is not covered by an enclosed check, please charge any deficiency to Deposit Account No. 23/2825.

Dated: May 15, 2006

Respectfully submitted,

By: 

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